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# BACTERIA TRANSPORT IN POROUS MEDIA

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Transport of bacteria in heterogeneous saturated porous media has been studied experimentally using a novel fluorescent microscopic imaging (FMI) technique. The approach involves 3D dynamic visualization and quantification of bacteria distributions within a refractive index-matched porous system. The experimental setup consists of a transparent porous column packed with clear mineral particles of various shapes and sizes in an aqueous sucrose-added fluid. The refractive index-matching allows direct optical probing at any point within the porous system. By staining bacteria and illuminating the porous regions within the column with a planar sheet of laser beam, bacteria transport through the porous medium can be observed and measured microscopically. A computer controlled CCD camera is used to record the fluorescent images at every vertical plane location while sweeping back and forth across the column. These images are then digitized and accumulated over a 3D volume within the porous column. Several bacteria were selected and tested for survivability and growth under our system's environment. Most bacteria appeared to survive and function normally under these conditions (e.g., sucrose addition for refractive index matching and staining for fluorescent imaging). Experiments were performed with a selected bacterium. The results provide a unique in-pore dynamic information on bacteria transport as a function of porosity, grain heterogeneity, and flow velocity.

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